Space Weather Forecast

Issued on Tuesday, 30 July 2024 at 13:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Coronal Mass Ejection arrivals expected, most likely day 2 (31 Jul), with G1-G2 Minor to Moderate storms and a chance of G3 Strong Storms. Ongoing Moderate to High activity.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High with at least eight Moderate class flares observed. There are eleven sunspot regions on the disc, with a number of these containing complex magnetic field structures. Slow growth has been observed in the larger of the regions in the southwest, with increasing areal extent, while a cluster of four sunspots persists just west of centre disc, with complex interactions between them due to their proximity. A further region in the north-centre disc also maintains complex mixed magnetic fields to its north, while a new in the southeast is showing apparent growth and increasing complexity as it rotates into view. SDO imagery also suggests the potential for a further oncoming strong region.

A number of coronal mass ejections (CMEs) were observed, with one assessed with the potential for Earth-directed components. This likely giving a glancing arrival on 01 Jul.

Solar Wind / Geomagnetic Activity: A CME arrived at 29/2320 UTC. Solar winds speeds, as measured by ACE at L1, increased from background to be slightly elevated with the arrival, from 350 km/s to 450-500 km/s. Interplanetary Magnetic Field, rose from weak to be Moderate to Strong from 29/2340 UTC, but eased after 30/0500 UTC to be mainly Moderate. The north-south component rose Moderately positive (northward) with the arrival, but then switched to Moderate negative (southward). An erratic weakening trend was then observed Geomagnetic activity was Quiet to Unsettled (Kp1-3) at first, but increased to Active to G1 Minor Storm with the CME arrival (Kp4-5), with G1 observed 30/0300-0600 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no Solar Radiation Storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to High activity is expected with further Moderate class flares expected and chance of isolated Strong-class flares.

Solar Wind /Geomagnetic Activity: A number of CMEs have the potential to arrival through the period. The CMEs from the M9.9 early on 28 Jul, and then the M2.6 and long period M1.7 later on 28 Jul are then expected to arrive either late day 1 or most likely early on day 2 (30-31 Jul), likely combining into a single arrival. A further glancing CME arrival is then likely on day 3-4 (01-02 Aug) from the M8.7 flare on 29 Jul. No fast wind enhancements are expected, with CME arrivals expected to dominate, bringing spells of slightly elevated to elevated winds, and periods of Active to G1-G2 Minor to Moderate Storms. There is a chance of G3 intervals, mainly day 2 (31 Jul).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to rise above background at times in response to any notable flaring that occurs. This will bring a slight chance of exceeding the S1 Minor Solar Radiation Storm level.

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	70	50	20
Strong	G3	No	15	25	10	5
Severe	G4	No	5	5	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	90	85	80	80
Very Active	R3 to R5 X	No	25	25	25	25

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	20	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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